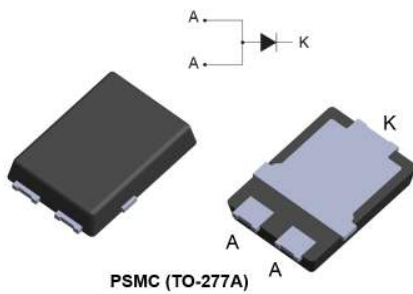


## 200 V ultrafast recovery diode



### Features

- Low profile design – package typical height of 1.1 mm typ.
- Wettable flanks for automatic visual inspection
- Very low conduction losses
- Negligible switching losses
- High junction temperature capability
- ECOPACK®2 compliant

### Applications

- DC/DC converter
- High frequency inverter
- Snubber
- Boost function
- Freewheeling diode

### Description

This device is an ultrafast recovery diode optimized for switching mode base drive and transistor circuits.

Packaged in PSMC (TO-277A), the **STTH802SF** provides a high level of performance in a compact and flat package which can withstand very high operating junction temperature.

Product status link	
<a href="#">STTH802SF</a>	
Product summary	
Symbol	Value
$I_{F(AV)}$	8 A
$V_{RRM}$	200 V
$T_j$ (max.)	175 °C
$V_F$ (typ.)	0.79 V
$t_{rr}$ (typ.)	17 ns

# 1 Characteristics

**Table 1. Absolute ratings (limiting values at 25 °C, unless otherwise specified, anode terminals short-circuited)**

Symbol	Parameter	Value	Unit
$V_{RRM}$	Repetitive peak reverse voltage	200	V
$I_{F(AV)}$	Average forward current, $\delta = 0.5$ square pulse	$T_c = 145\text{ °C}$	A
$I_{FSM}$	Surge non repetitive forward current	$t_p = 10\text{ ms}$ sinusoidal	A
$T_{stg}$	Storage temperature range	-65 to +175	°C
$T_j$	Maximum operating junction temperature	+175	°C

**Table 2. Thermal resistance parameters**

Symbol	Parameter	Typ. value	Unit
$R_{th(j-c)}$	Junction to case	2.4	°C/W

For more information, please refer to the following application note:

- AN5088 : Rectifiers thermal management, handling and mounting recommendations

**Table 3. Static electrical characteristics (anode terminals short-circuited)**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit	
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ °C}$	$V_R = V_{RRM}$	-		6	$\mu\text{A}$
		$T_j = 125\text{ °C}$		-	6	60	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 8\text{ A}$	-	0.94	1.08	V
		$T_j = 125\text{ °C}$		-	0.79	0.91	

1. Pulse test:  $t_p = 5\text{ ms}$ ,  $\delta < 2\%$

2. Pulse test:  $t_p = 380\text{ }\mu\text{s}$ ,  $\delta < 2\%$

To evaluate the conduction losses, use the following equation:  $P = 0.77 \times I_{F(AV)} + 0.018 \times I_F^2(RMS)$

For more information, please refer to the following application notes related to the power losses:

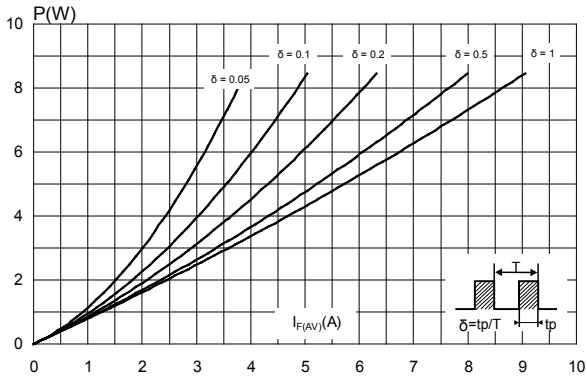
- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses in a power diode

**Table 4. Dynamic electrical characteristics**

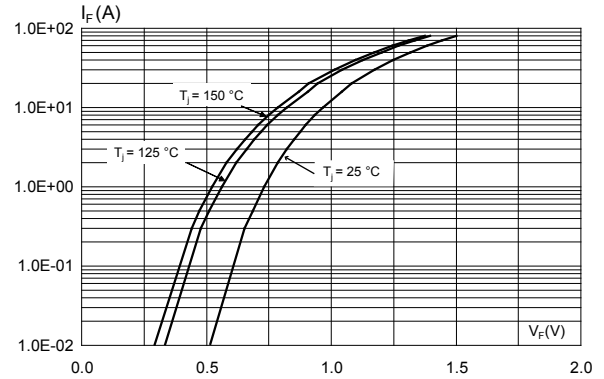
Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit	
$t_{rr}$	Reverse recovery time	$T_j = 25\text{ °C}$	$I_F = 1.0\text{ A}$ , $di_F/dt = -50\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$	-		35	ns
			$I_F = 1.0\text{ A}$ , $di_F/dt = -100\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$	-	17	22	
$I_{RM}$	Reverse recovery current	$T_j = 125\text{ °C}$	$I_F = 8\text{ A}$ , $di_F/dt = -200\text{ A}/\mu\text{s}$ , $V_R = 160\text{ V}$	-	5.8	7.5	A
$Q_{rr}$	Reverse recovery charge			-	100		nC

## 1.1 Characteristics (curves)

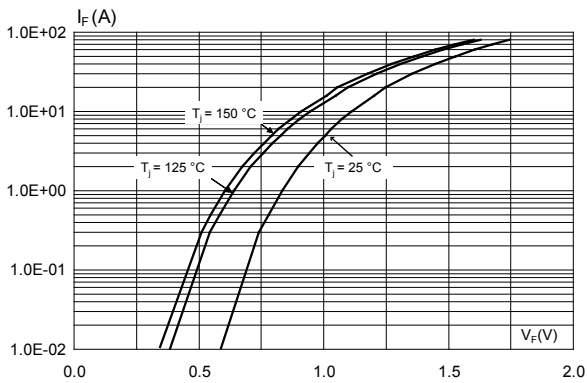
**Figure 1. Average forward power dissipation versus average forward current**



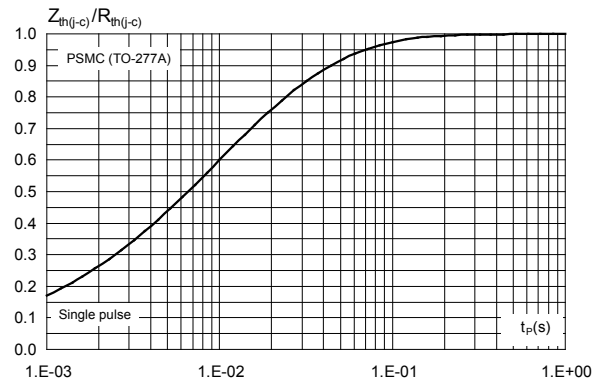
**Figure 2. Forward voltage drop versus forward current (typical values)**



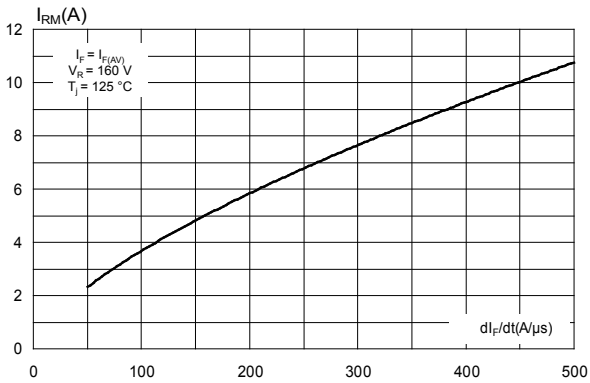
**Figure 3. Forward voltage drop versus forward current (maximum values)**



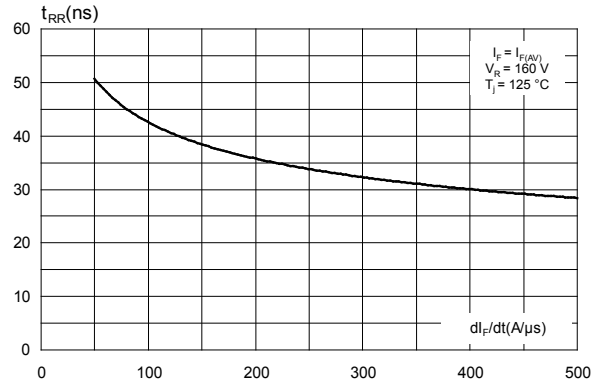
**Figure 4. Relative variation of thermal impedance junction to case versus pulse duration**



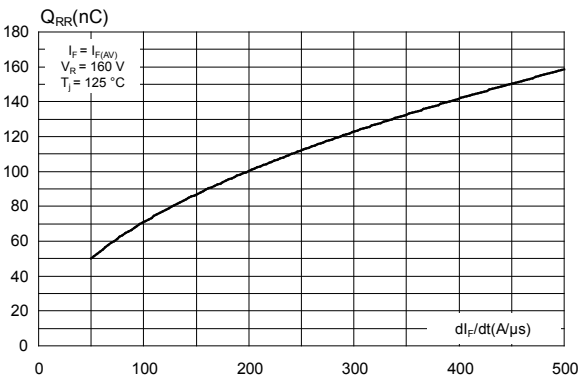
**Figure 5. Peak reverse recovery current versus  $di_F/dt$  (typical values)**



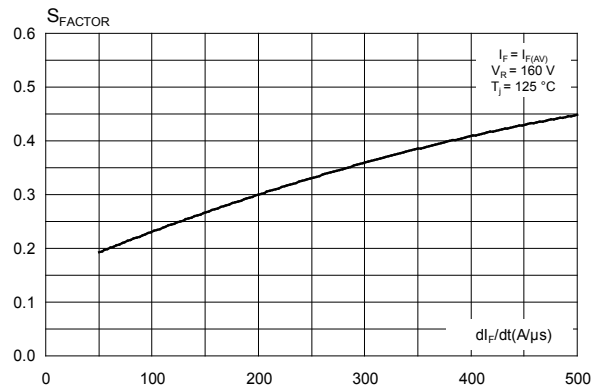
**Figure 6. Reverse recovery time versus  $di_F/dt$  (typical values)**



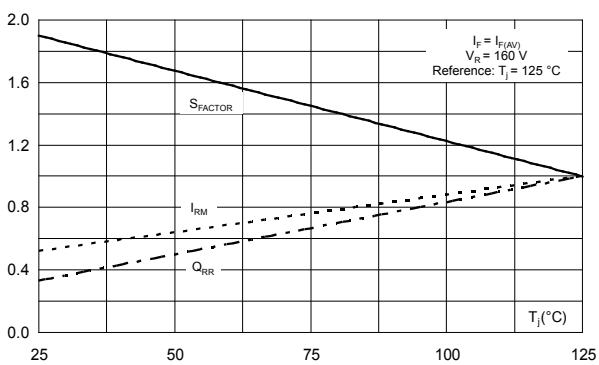
**Figure 7. Reverse recovery charges versus  $di_F/dt$  (typical values)**



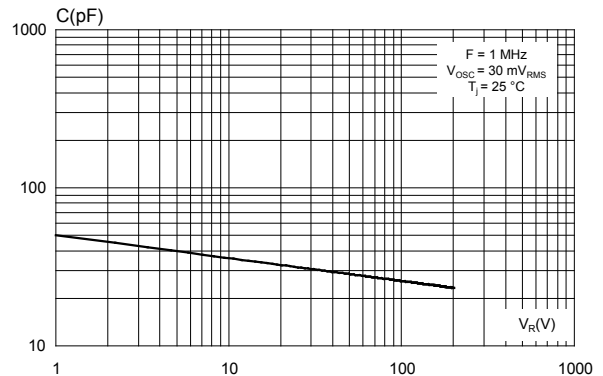
**Figure 8. Reverse recovery softness factor versus  $di_F/dt$  (typical values)**



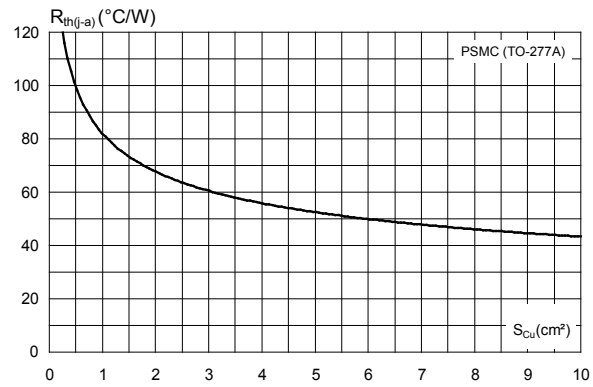
**Figure 9. Relative variations of dynamic parameters versus junction temperature**



**Figure 10. Junction capacitance versus reverse voltage applied (typical values)**



**Figure 11. Thermal resistance junction to ambient versus copper surface under tab (typical values, epoxy printed board FR4,  $e_{Cu} = 35 \mu m$ ) (PSMC (TO-277A))**



## 2 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK® is an ST trademark.

### 2.1 PSMC (TO-277A) package information

- Epoxy meets UL94,V0
- Cooling method : by conduction (C)

Figure 12. PSMC (TO-277A) package outline

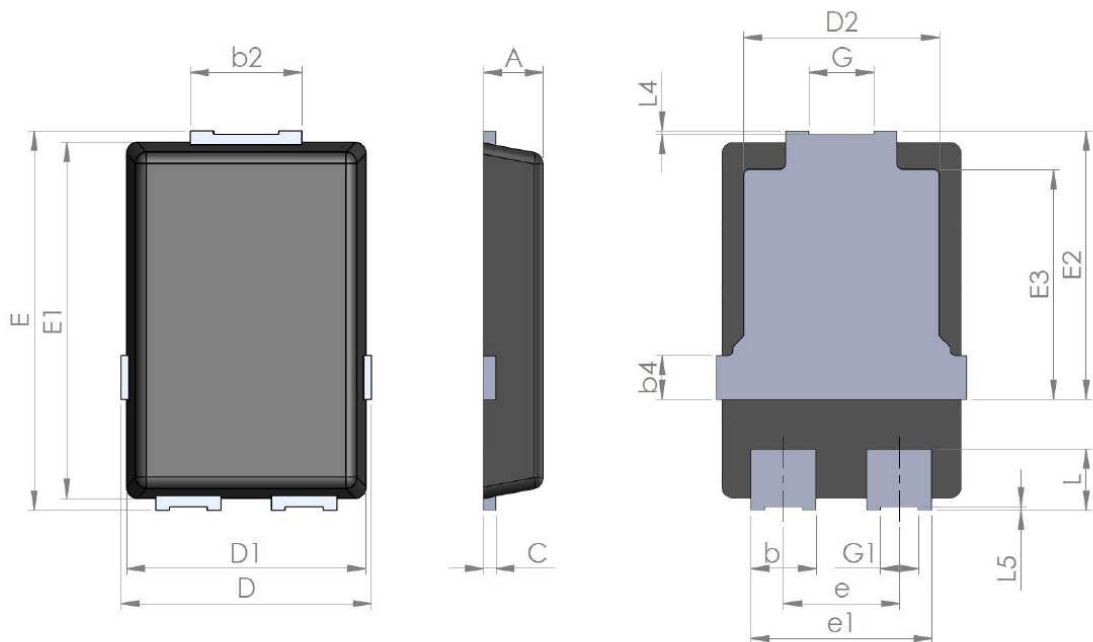
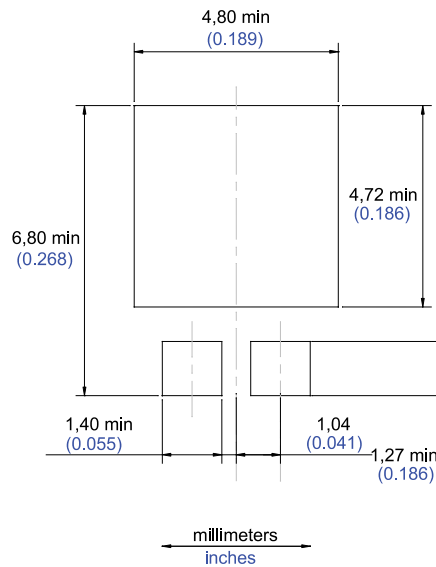


Table 5. PSMC (TO-277A) package mechanical data

Ref.	Dimensions					
	Millimeters			Inches (for reference only)		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	1.00	1.10	1.20	0.039	0.043	0.047
b	1.05	1.20	1.35	0.041	0.047	0.053
b2	1.90	2.05	2.20	0.075	0.081	0.087
b4		0.75			0.029	
C	0.15	0.23	0.40	0.006	0.009	0.016
D	4.45	4.60	4.75	0.175	0.181	0.187
D1	4.25	4.40	4.45	0.167	0.173	0.175
D2	3.40	3.60	3.70	0.134	0.142	0.146

Ref.	Dimensions					
	Millimeters			Inches (for reference only)		
	Min.	Typ.	Max.	Min.	Typ.	Max.
E	6.35	6.50	6.65	0.250	0.256	0.262
E1	6.05	6.10	6.15	0.238	0.240	0.242
E2	4.50	4.60	4.70	0.177	0.181	0.185
E3		3.94			1.55	
e		2.13			0.084	
e1		3.33			0.131	
G		1.20			0.047	
G1		0.70			0.027	
L	0.90	1.05	1.24	0.035	0.041	0.049
L4	0.02			0.0008		
L5	0.02			0.0008		

**Figure 13. PSMC (TO-277A) package footprint in mm (in inches)**



### 3 Ordering information

**Table 6. Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH802SF	TH802	PSMC (TO-277A)	90 mg	6000	Tape and Reel



## Revision history

**Table 7. Document revision history**

Date	Version	Changes
04-Jul-2018	1	Initial release.
10-Jul-2018	2	Updated Table 1. Absolute ratings (limiting values at 25 °C, unless otherwise specified, anode terminals short-circuited).

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